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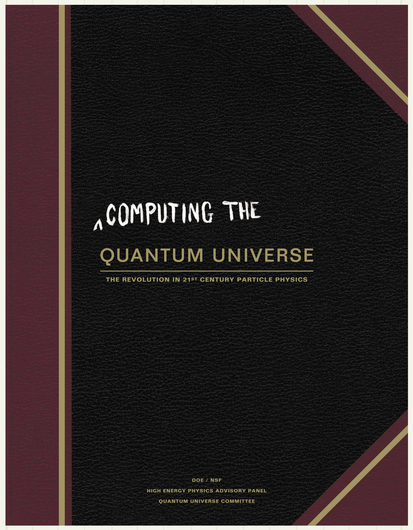

THE QUEST TO EXPLAIN THE WORLD IN TERMS OF QUANTUM PHYSICS MEANS A REVOLUTION IN PARTICLE PHYSICS— BUILT ON A PARALLEL REVOLUTION IN THE ABILITY TO STORE, TRANSFER, PROCESS AND ANALYZE THE DATA THAT WILL ANSWER OUR DEEPEST QUESTIONS ABOUT THE UNIVERSE.

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WELCOME

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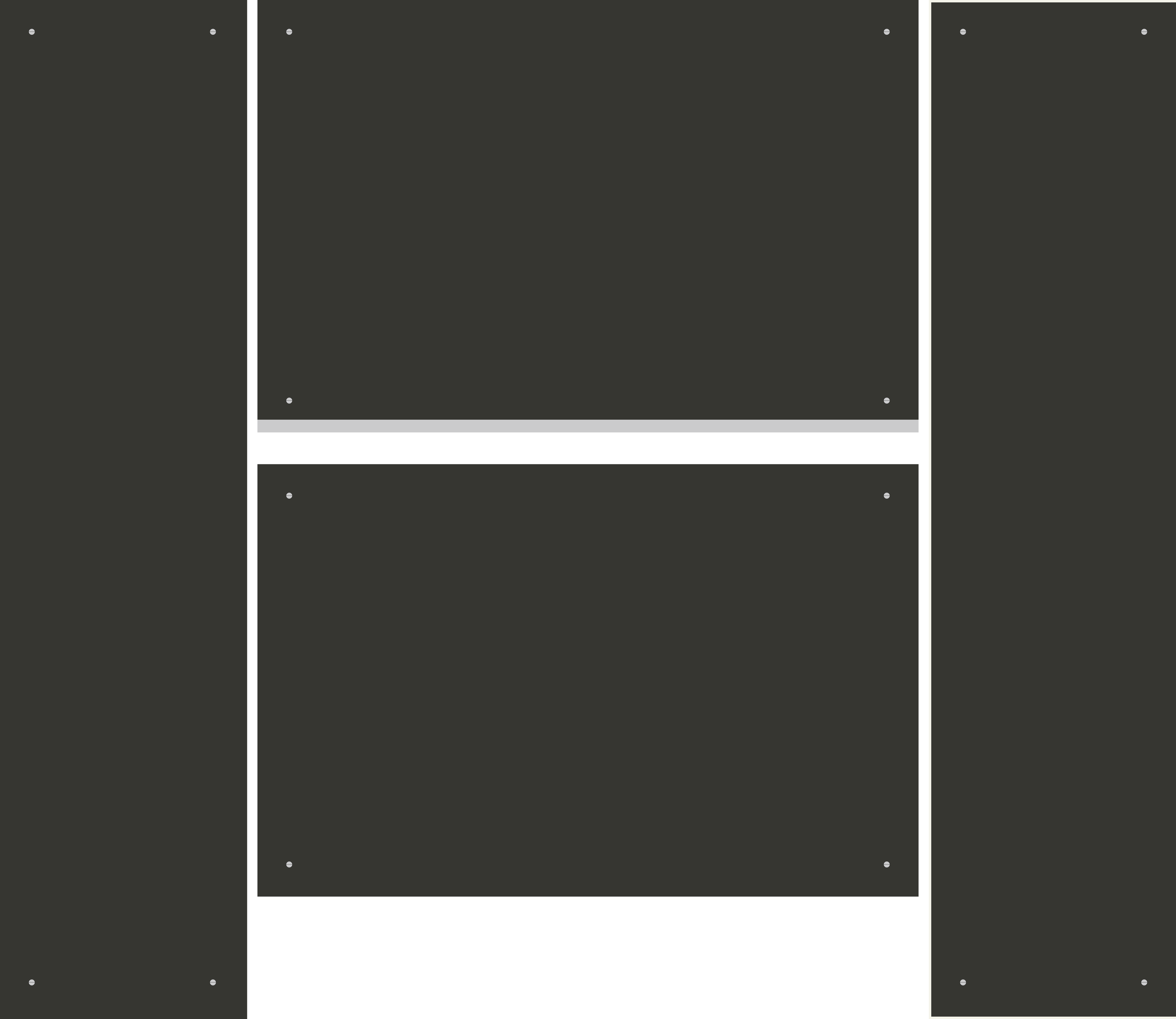

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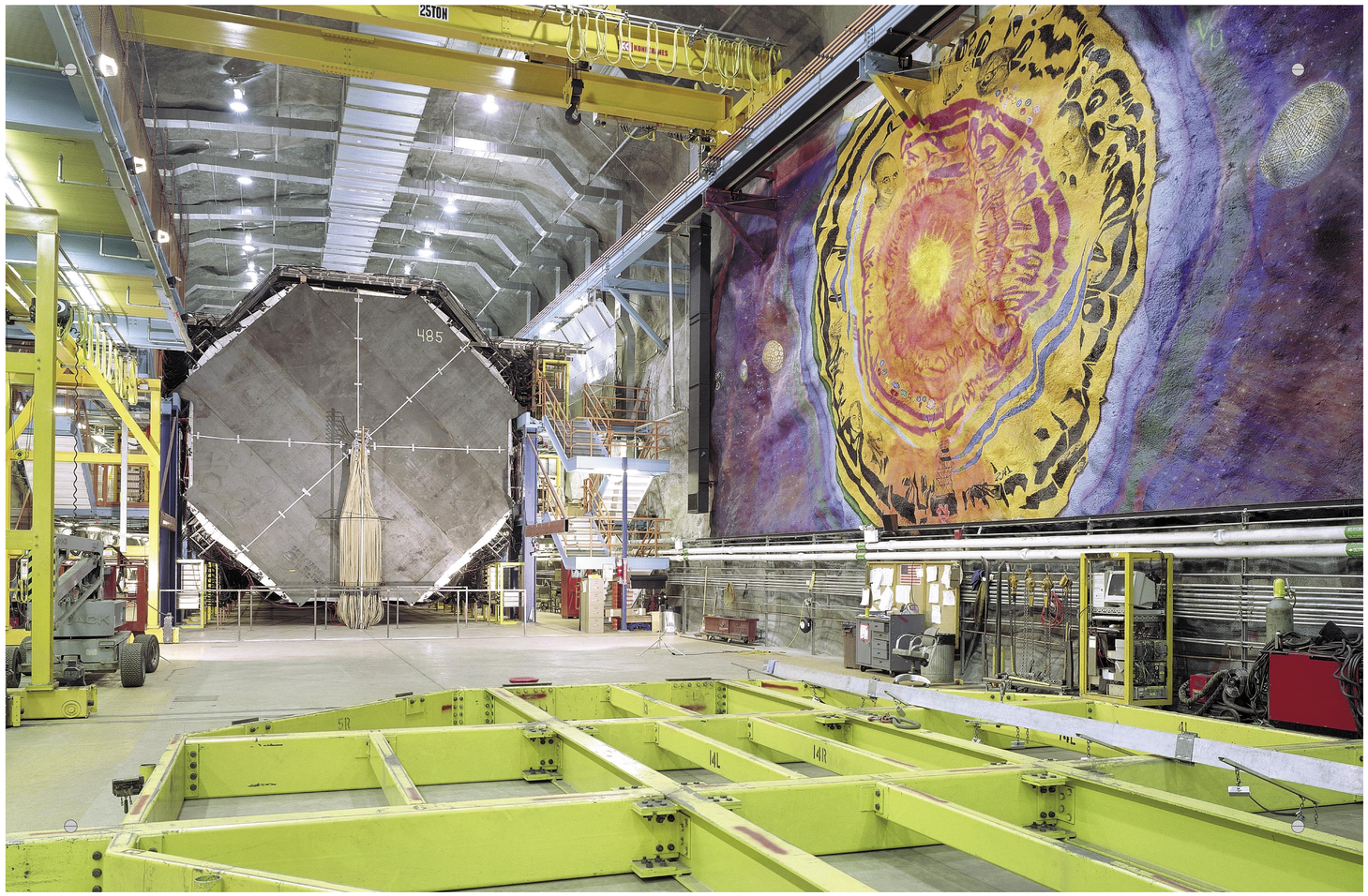
COMPUTING THE QUANTUM UNIVERSE

THE HUGE VOLUME OF DATA FROM PHYSICS EXPERIMENTS AROUND THE WORLD CALLS FOR QUANTUM LEAPS IN COMPUTING CAPABILITY TO SUPPORT THE REVOLUTION IN PARTICLE PHYSICS.



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WHAT HAPPENED TO THE ANTIMATTER? THE SILICON VERTEX TRACKER IS THE HEART OF THE BABAR EXPERIMENT AT SLAC. IN THE PHOTO, PHYSICISTS ARE PUTTING THE FINISHING TOUCHES ON IMPROVEMENTS TO THE DETECTOR.
(CREDIT: PETER GINTER)

$$P(\nu_\mu \rightarrow \nu_x) = \sin^2 2\theta \sin^2[1.27\,\Delta m^2(\tfrac{L}{E})]$$

WHAT ARE NEUTRINOS TELLING US? MINOS FAR DETECTOR IN SOUDAN, MN - COMPLETED DETECTOR SHOWING PLATE 485
(CREDIT: FERMILAB)

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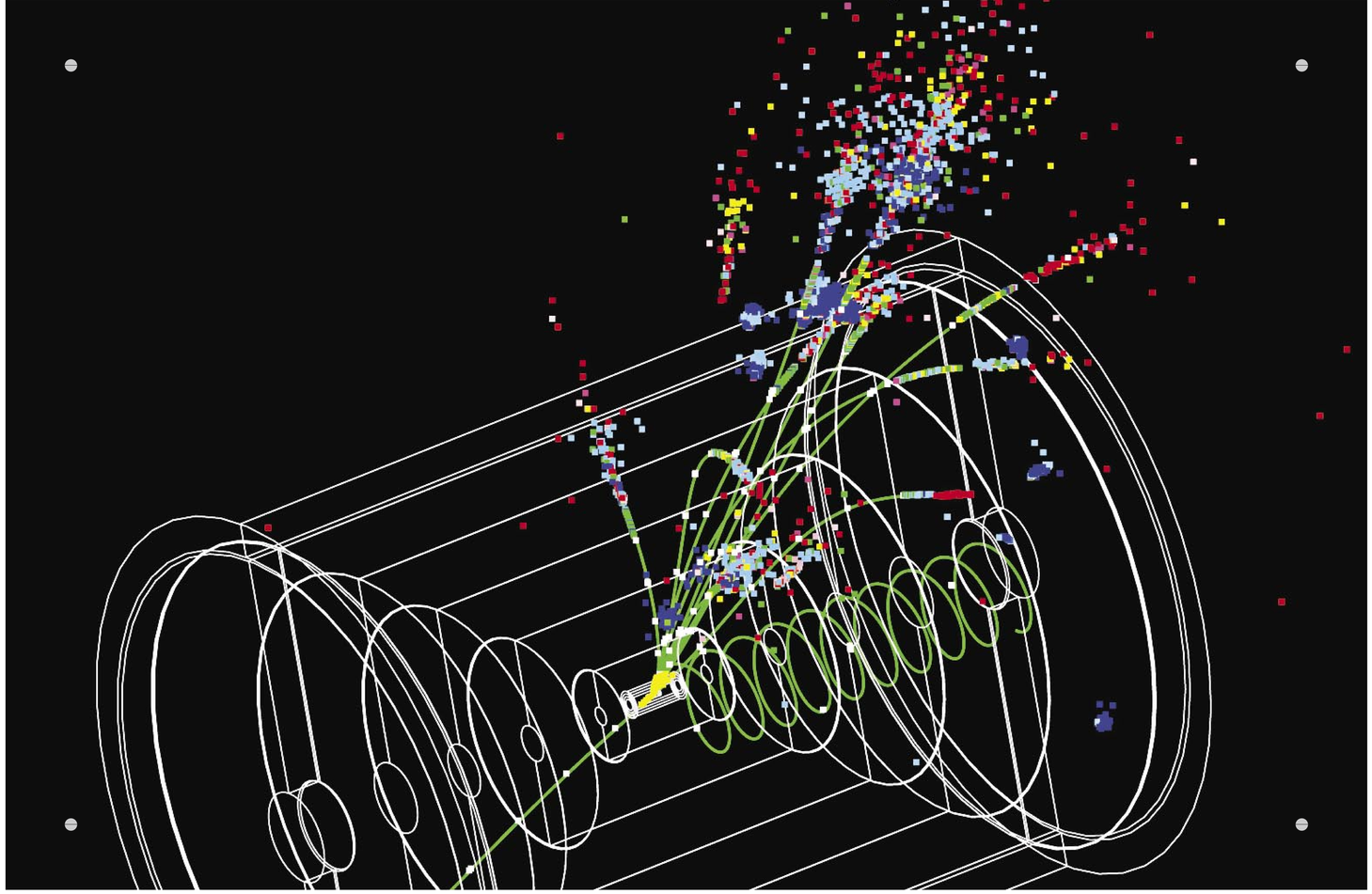
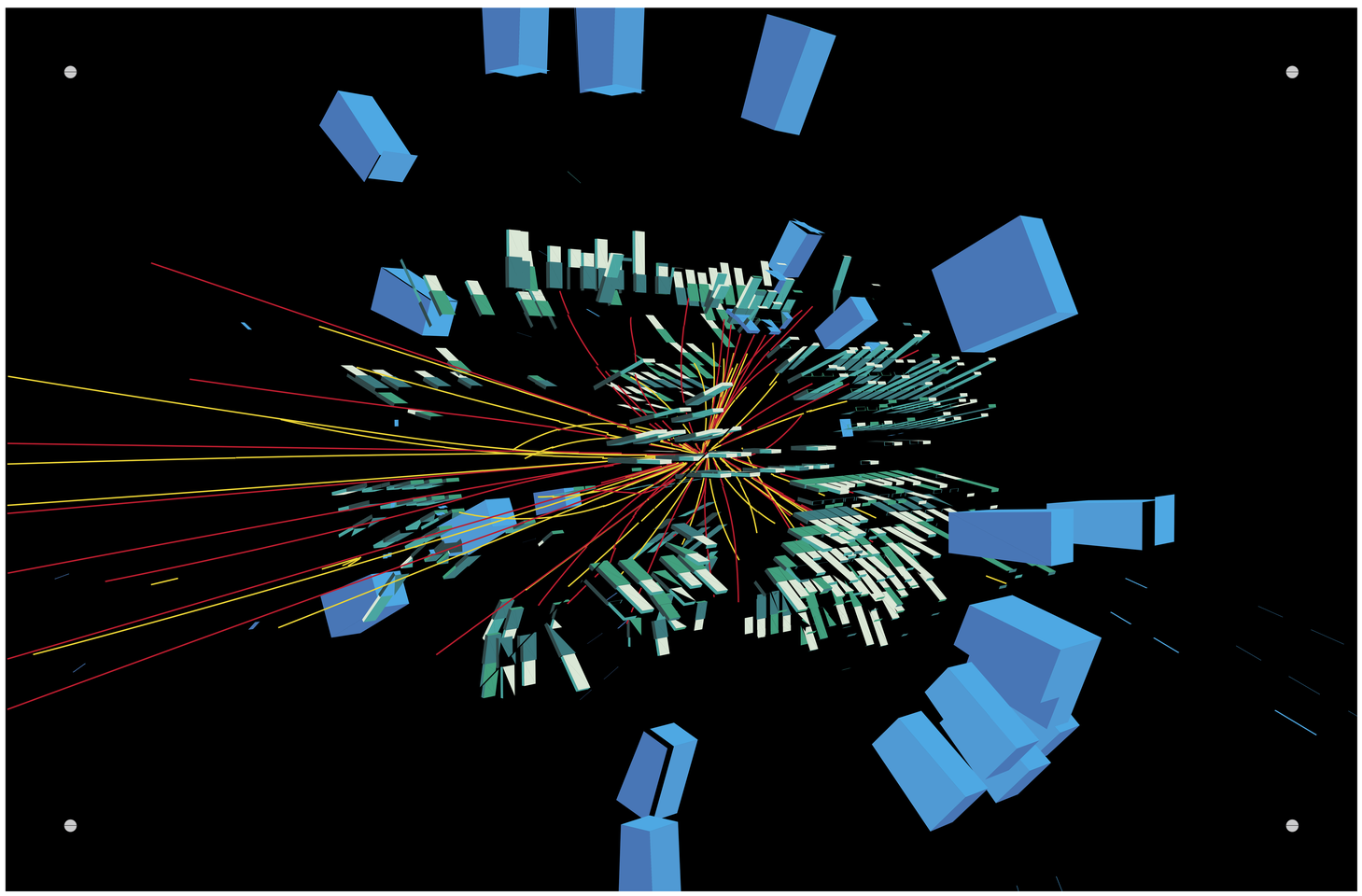
COMPUTING THE QUANTUM UNIVERSE

"OPPORTUNITIES HAVE EMERGED FOR DISCOVERY ABOUT THE FUNDAMENTAL NATURE OF THE UNIVERSE THAT WE NEVER EXPECTED. TECHNOLOGY PLACES THESE DISCOVERIES WITHIN OUR REACH, BUT WE NEED TO FOCUS EFFORTS ACROSS WIDELY SEPARATED DISCIPLINES TO REALIZE THE NEW OPPORTUNITIES."

-PRESIDENTIAL SCIENCE ADVISOR JOHN MARBURGER





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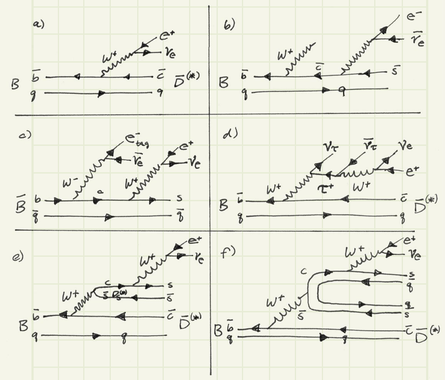
WHAT IS DARK MATTER? HOW CAN WE MAKE IT IN THE LABORATORY? THE ELECTRONIC SIGNATURE OF A HYPOTHETICAL PARTICLE, THE STILL-UNDISCOVERED NEUTRALINO, ONE CANDIDATE FOR DARK MATTER. (CREDIT: NORMAN GRAF)



WHY ARE THERE SO MANY KINDS OF PARTICLES? THE ELECTRONIC SIGNATURE OF A PROTON-ANTIPROTON COLLISION AT FERMILAB'S DZERO EXPERIMENT. (CREDIT: FERMILAB)

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COMPUTING THE QUANTUM UNIVERSE

UNDERSTANDING THE UNKNOWN UNIVERSE REQUIRES DISCOVERING THE PARTICLE PHYSICS THAT DETERMINES ITS FUNDAMENTAL NATURE. POWERFUL COMPUTATIONAL TOOLS ARE REQUIRED TO BRING THE PHYSICS WITHIN REACH.

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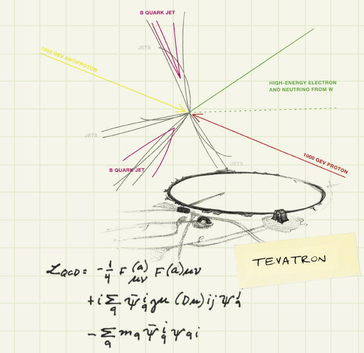
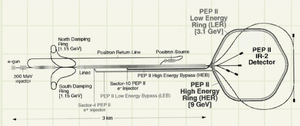
← THE DEPARTMENT OF ENERGY'S FERMI NATIONAL ACCELERATOR LABORATORY IN BATAVIA, ILLINOIS. (CREDIT: FERMILAB)



$$\mathcal{L}_{QCD} = -\frac{1}{4} F^{(a)}_{\mu\nu} F^{(a)\mu\nu} + i\sum_q \bar{\psi}^i_q \gamma^\mu (D_\mu)_{ij} \psi^j_q - \sum_q m_q \bar{\psi}^i_q \psi_{qi}$$



← THE RESEARCH YARD AT THE DEPARTMENT OF ENERGY'S STANFORD LINEAR ACCELERATOR CENTER. (CREDIT: PETER GINTER)

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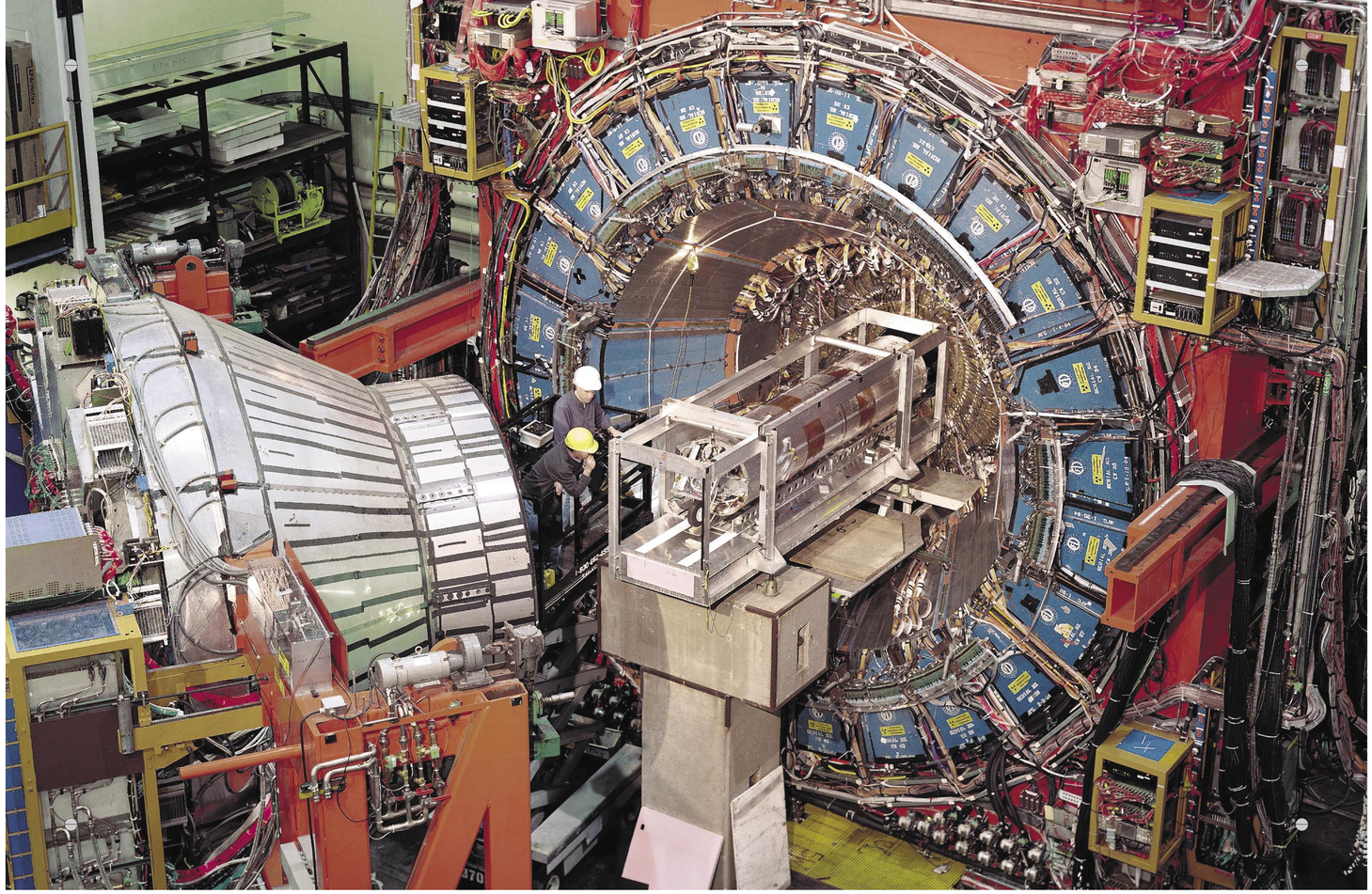
COMPUTING THE QUANTUM UNIVERSE

"JUST AS WE HAVE TO EMBRACE TECHNOLOGY TO DO OUR SCIENCE, WE HAVE TO EMBRACE THE CONCEPT OF FITTING OUR COMPUTING INTO A BIGGER SCIENTIFIC ECOSYSTEM, NOT JUST HIGH-ENERGY PHYSICS. IF WE DO THAT, OUR SCIENCE WILL BE BETTER, WE WILL SHARE WITH OTHER PEOPLE AND HAVE AN IMPACT ON SOCIETY, WHICH EVERYONE HOPES AND DREAMS FOR."

-VICKY WHITE, FERMILAB COMPUTING DIVISION HEAD



INSERT CAPTION

(SLAC DISK ROBOT)

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